ABSTRACT OF THE DISCLOSURE

Chiral ligands and transition metal complexes based on such chiral ligands useful in asymmetric catalysis are disclosed. The chiral ligands include (R,S,S,R)-DIOP*. The ruthenium complex reduces enamide to the corresponding amine with up to 99% enantioselectivity. The transition metal complexes of the chiral ligands are useful in asymmetric reactions such as asymmetric hydrogenation, hydride transfer, hydrosilylation, hydroboration, hydrovinylation, hydroformylation, hydrocarboxylation, isomerization, allylic alkylation, cyclopropanation, Diels-Alder reaction, Heck reaction, isomerization, Aldol reaction, Michael addition and epoxidation reactions.

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